

Application Type Renewal
Facility Type IW
Major / Minor Major

**NPDES PERMIT FACT SHEET
INDIVIDUAL INDUSTRIAL WASTE (IW)
AND IW STORMWATER**

Application No. PA0008281
APS ID 326722
Authorization ID 872106

Applicant and Facility Information

Applicant Name	<u>PPL Brunner Island LLC</u>	Facility Name	<u>PPL Brunner Island Power Station</u>
Applicant Address	<u>2 N. 9th Street</u> <u>Allentown, PA 18101-1139</u>	Facility Address	<u>Wago Road - Brunner Island</u> <u>York Haven, PA 17370-0221</u>
Applicant Contact	<u>Nancy Evans</u>	Facility Contact	<u>Deb Runkle</u>
Applicant Phone	<u>610-774-4309</u>	Facility Phone	<u>717-266-7550</u>
Client ID	<u>141473</u>	Site ID	<u>447501</u>
SIC Code	<u>4911</u>	Municipality	<u>East Manchester Township</u>
SIC Description	<u>Trans. & Utilities - Electric Services</u>	County	<u>York</u>
Date Application Received	<u>March 18, 2011</u>	EPA Waived?	<u>No</u>
Date Application Accepted	<u>March 23, 2011</u>	If No, Reason	<u>Major Facility</u>
Purpose of Application	<u>Renewal of NPDES permit (revised draft permit).</u>		

Discussion

A draft NPDES permit was issued to PPL Brunner Island LLC (PPL) on March 9, 2012. A number of comments were received from EPA, PPL and third parties on the draft permit during the comment period. DEP has decided to prepare a revised draft permit in response to the comments. The purpose of this fact sheet is to explain changes being proposed to the revised draft permit in comparison to the March 9, 2012 draft permit. The bases for the original draft permit are described in the fact sheet dated February 22, 2012 (attached) and will not be readdressed in this fact sheet.

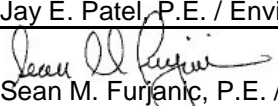


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I. Development of Effluent Limitations

Comments were received from EPA and third parties that DEP should establish technology-based effluent limitations (TBELs) in PPL's NPDES permit, particularly for Outfall 007 (flue gas desulfurization (FGD) wastewater), using best professional judgment under 40 CFR 125.3(c). Based on these comments, DEP has reevaluated effluent limits for process wastewater discharges and performed a TBEL analysis for flue gas desulfurization (FGD) wastewater (Outfall 007) and bottom ash wastewater (Outfalls 004 and 005). Following the determination of TBELs, DEP evaluated water quality-based effluent limitations (WQBELs) and selected the more stringent for each parameter as the limitation for the NPDES permit. The effluent limitation analysis is presented sequentially by discharge point.

The Susquehanna River in the immediate vicinity of Water Quality Network station 201 (Susquehanna River at Marietta) is listed as impaired for metals. This impairment listing is based on monthly sampling results from WQN0201, which show periodic exceedances of numeric water quality criteria for Aluminum, Copper, Iron, Lead, Manganese, and Zinc in the period 2006 to 2013. Based on investigation of these sample results, the exceedances are correlated with high flow events and originate primarily from non-point, precipitation-induced sources. PPL Brunner Island is not a significant source of these

Approve	Return	Deny	Signatures	Date
X			Jay E. Patel, P.E. / Environmental Engineer Manager	
X			 Sean M. Furlan, P.E. / Program Manager, Central Office	4/29/14

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metals and DEP does not consider this point source as causing or contributing to the impairment listing at WQN0201. However, at a minimum, monitoring requirements will be established for all of these metals at any outfall where these metals may be present.

Effluent limitations for Outfall 001 (non-contact cooling water) and Outfall 003 (sewage effluent) as proposed in the March 9, 2012 draft permit are considered appropriate and will remain in the revised draft permit.

A. Outfall 002 – Low Volume Wastes and Coal Pile Runoff

The “incidental waste treatment basin” (IWTB) receives wastewaters and storm water from several sources, including reverse osmosis filtrate from the plant’s water treatment system, runoff from coal piles stored outdoors, plant and yard drains and sumps from Units 1 and 2, and boiler blowdown from Units 1 and 2. The average discharge from the IWTB to Outfall 002 was 1.86 MGD during calendar years 2012 and 2013, with a maximum daily discharge rate of 2.9 MGD. The “design flow” of this discharge is reported to be 2.0 MGD. PPL Brunner Island uses aluminum sulfate to coagulate and settle wastewater constituents in the IWTB. The treatment process in the IWTB operates by pH adjustment using sulfuric acid, sodium carbonate or sodium hydroxide to maintain the pH level between 6.5 and 8.5 S.U. The wastewater enters a control station, which includes a pH probe, prior to entering the first of three treatment cells. Aluminum sulfate is used to aid the precipitation/sedimentation process. The effluent is monitored and adjusted for pH; however, recirculation pumps are automatically activated to recycle the effluent if the pH does not fall within the maintained range of 6.5 – 8.5 S.U. The IWTB also uses oil booms to control the oil and grease levels in the final effluent.

1. Effluent Limitation Guidelines (ELGs) and Treatment Standards

The wastewater influent to the IWTB is considered low volume waste (non-FGD) as per 40 CFR 423.11(b) and coal pile runoff. The effluent limitation guidelines (ELGs) established in 40 CFR 423.12(b)(3) and (b)(9) apply, as follows:

- Total Suspended Solids (TSS) – 30 mg/L average monthly and 50 mg/L instantaneous maximum (IMAX); and
- Oil and Grease – 15 mg/L average monthly and 20 mg/L maximum daily.

For TSS, a maximum daily limit of 50 mg/L has been established for Outfall 002 based on the IMAX limit of 50 mg/L contained in the ELG. For Oil and Grease, an IMAX limit of 30 mg/L has been established in accordance with 25 Pa. Code § 95.2(2)(ii). In addition, pH limitations of 6.0 S.U. (minimum) and 9.0 S.U. (maximum) are proposed, consistent with 25 Pa. Code § 95.2(1).

2. Best Professional Judgment (BPJ) TBELs

Over the past two years (January 2012 – December 2013), DMR data for toxic parameters have revealed “non-detect” results (i.e., not detected above the laboratory quantitation limit) over 50% of the time.

Table 1: 2012 and 2013 DMR Statistics for Outfall 002

Pollutant	Average Concentration	95 th Percentile Concentration	Maximum Concentration	% of Results “Non-Detect”
Total Aluminum	0.346 mg/L	0.57 mg/L	0.648 mg/L	0
Total Arsenic	< 0.0017 mg/L	< 0.0026 mg/L	0.003 mg/L	75
Total Boron	0.057 mg/L	0.115 mg/L	0.117 mg/L	0
Total Cadmium	< 0.0004 mg/L	< 0.0008 mg/L	< 0.001 mg/L	100
Total Chromium	< 0.0017 mg/L	< 0.002 mg/L	< 0.002 mg/L	75
Total Copper	< 0.012 mg/L	< 0.02 mg/L	< 0.02 mg/L	75
Total Iron	0.57 mg/L	0.96 mg/L	0.97 mg/L	0
Total Lead	< 0.0015 mg/L	< 0.0036 mg/L	< 0.005 mg/L	100
Total Mercury	0.0000042 mg/L	0.0000086 mg/L	0.0000094 mg/L	0
Total Molybdenum	< 0.007 mg/L	< 0.02 mg/L	< 0.02 mg/L	75
Total Nickel	< 0.009 mg/L	< 0.02 mg/L	< 0.02 mg/L	75
Total Selenium	< 0.0018 mg/L	< 0.004 mg/L	< 0.004 mg/L	88
Total Zinc	< 0.018 mg/L	< 0.032 mg/L	0.036 mg/L	50

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PPL's existing treatment for Outfall 002 is commensurate with "best available technology" (BAT). If BPJ TBELs were to be developed for this discharge, they would be based on existing performance and be expressed as average monthly and maximum daily limits, with a corresponding increase in sampling frequency. However, considering the effectiveness of the existing treatment system and the very low levels of pollutants in the discharge, DEP does not believe that an increased sampling frequency is warranted for this discharge. Quarterly monitoring of the discharge for the purpose of verifying continued low levels of pollutants in the discharge will therefore be continued.

3. WQBELs

DEP has used its "Toxics Screening Analysis" worksheet to evaluate pollutants for possible water quality modeling using its PENTOXSD model. The results, presented in **Attachment A**, reveal that two pollutants, Total Lead and Total Cadmium, have maximum DMR concentrations exceeding water quality standards. However, considering the values were "non-detect" (not detected above the laboratory's quantitation limit) and the significant dilution available in the Susquehanna River (stream to waste flow ratio is over 1,000:1), WQBELs for Outfall 002 are not applicable.

4. Proposed Limits and Monitoring Requirements

DEP proposes that the same limits and monitoring requirements that were included in the March 9, 2012 draft permit be retained in the revised draft permit, with the addition of a quarterly monitoring requirement for Total Manganese. Total Dissolved Solids (TDS) concentrations are well below 1,000 mg/L according to the permit application, and therefore TDS and its major constituent ions will not be subject to routine monitoring. The proposed limits and monitoring requirements for Outfall 002 are presented in **Attachment A**.

B. Outfalls 004 and 005 – Bottom Ash Water, Low Volume Wastes, Coal Pile Runoff and Leachate

Outfall 004 receives a variety of low volume wastes, bottom ash transport water, and coal pile runoff. The wastes flow into Ash Basin No. 6, then into a polishing pond where chemical treatment and pH neutralization are performed prior to discharge to Outfall 004. PPL is planning to close Ash Basin No. 6 in the near future (perhaps by 2015). Wastewater currently flowing to Ash Basin No. 6 will be diverted to an existing industrial wastewater treatment plant (IWTP) located adjacent to PPL's cooling tower system that has been constructed but has not yet been utilized. The construction of this IWTP has been authorized through a Water Quality Management (WQM) permit (No. 6709202), issued by DEP in 2010. Outfall 004 will remain in the permit to address the period of time until the discharge is relocated to the condenser discharge channel. The average and maximum daily discharge rates from Outfall 004 over the past two years have been 4.0 MGD and 9.1 MGD, respectively. The IWTP has been designed for an annual average flow of 5.5 MGD, and will receive similar wastestreams as are currently routed to Ash Basin No. 6, but will also receive leachate from an on-site landfill.

It is noted that the March 9, 2012 draft permit established a proposed Outfall 008 for the relocated Outfall 004 discharge. The revised draft permit will use "Outfall 005" as the proposed outfall number for the new IWTP. Outfall 005, which was previously an emergency overflow discharge from an equalization basin, has been eliminated by PPL. Following closure of Ash Basin No. 6, the existing Outfall 004 discharge point will receive stormwater only. Outfall 004 will be renumbered to Outfall 031 for the future stormwater discharges.

1. Effluent Limitation Guidelines (ELGs) and Treatment Standards

The wastewater influent to Ash Basin No. 6 and the IWTP is considered low volume waste and bottom ash. In addition, coal pile runoff currently flows into Ash Basin No. 6 but such runoff is not expected to be treated in the IWTP. The ELGs established in 40 CFR 423.12(b)(3), (b)(4) and (b)(9) apply, as follows:

- Total Suspended Solids (TSS) – 30 mg/L average monthly and 50 mg/L instantaneous maximum (IMAX); and
- Oil and Grease – 15 mg/L average monthly and 20 mg/L maximum daily.

For TSS, a maximum daily limit of 50 mg/L has been established for Outfall 004 based on the IMAX limit of 50 mg/L contained in the ELG. For Oil and Grease, an IMAX limit of 30 mg/L has been established in accordance with 25 Pa. Code § 95.2(2)(ii).

In addition, pH limitations of 6.0 S.U. (minimum) and 9.0 S.U. (maximum) are proposed, consistent with 25 Pa. Code § 95.2(1). In accordance with 25 Pa. Code § 95.2(1)(ii), DEP has historically provided an allowance to PPL for Outfalls 002

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and 004 to exceed pH limitations (i.e., exceed 9.0 maximum) due to biological respiration in the impoundments. This allowance will be continued in the renewed permit until such time that Outfall 004 is relocated to the condenser discharge channel.

2. Best Professional Judgment (BPJ) TBELs

Over the past two years (January 2012 – December 2013), DMR data for toxic parameters in Outfall 004 are as follows:

Table 2: 2012 and 2013 DMR Statistics for Outfall 004

Pollutant	Average Concentration	95 th Percentile Concentration	Maximum Concentration	% of Results "Non-Detect"
Total Aluminum	0.32 mg/L	0.53 mg/L	0.6 mg/L	0
Total Arsenic	0.006 mg/L	0.0077 mg/L	0.008 mg/L	13
Total Boron	0.107 mg/L	0.148 mg/L	0.15 mg/L	0
Total Cadmium	< 0.00024 mg/L	< 0.0004 mg/L	< 0.0005 mg/L	88
Total Chromium	< 0.0017 mg/L	< 0.002 mg/L	< 0.002 mg/L	75
Total Copper	< 0.0034 mg/L	< 0.004 mg/L	< 0.004 mg/L	75
Total Iron	0.379 mg/L	0.684 mg/L	0.688 mg/L	0
Total Lead	< 0.001 mg/L	< 0.001 mg/L	< 0.001 mg/L	100
Total Mercury	0.0000036 mg/L	0.000006 mg/L	0.000006 mg/L	0
Total Molybdenum	< 0.0078 mg/L	< 0.02 mg/L	< 0.02 mg/L	75
Total Nickel	< 0.016 mg/L	< 0.028 mg/L	< 0.032 mg/L	75
Total Selenium	< 0.0025 mg/L	< 0.004 mg/L	< 0.004 mg/L	75
Total Zinc	< 0.019 mg/L	< 0.029 mg/L	< 0.034 mg/L	75

The 002 and 004 wastewaters are similar in nature, with the major exception of Outfall 004 receiving bottom ash transport water. The effluent limits and monitoring requirements for Outfall 004 in PPL's existing permit are adequate and will continue until closure of Ash Basin No. 6 and diversion of wastestreams to the IWTP, except that the limits for TSS will be adjusted to conform to the ELGs identified in Section I.B.1, above. BPJ TBELs, however, will be developed for Outfall 005 considering the larger wastewater flow, introduction of landfill leachate, and engineered treatment system.

According to the WQM application, the new IWTP will treat influent wastewater as follows:

Influent Mix Tanks → Sedimentation → Flocculator/Clarifiers → Effluent Mix Tanks → Discharge to Outfall 005

The treatment process will be designed to operate using sulfuric acid or sodium hydroxide to adjust pH and ferric chloride as the coagulant. These chemicals will be introduced into the influent mix tanks, which use variable speed mixers to ensure proper mixing. As wastewater flows from the influent mix tanks to the flocculator/clarifier units, polymer will be added as needed. Following the clarification process the wastewater enters an effluent mix tank to adjust pH. Effluent that is not recycled to maintain wastewater treatment processes will be discharged to the condenser discharge channel.

The IWTP is expected to produce an effluent with similar pollutant concentrations as the existing Outfall 004 discharge. PPL has projected the following average concentrations, as reported in its application:

- Total Aluminum – 0.29 mg/L
- Total Arsenic – 0.006 mg/L
- Total Boron – 0.2 mg/L
- Total Cadmium – 0.0002 mg/L
- Total Chromium – 0.002 mg/L
- Total Copper – 0.004 mg/L
- Total Iron – 0.27 mg/L
- Total Lead – 0.001 mg/L
- Total Mercury – 0.0000046 mg/L
- Total Molybdenum – 0.01 mg/L
- Total Nickel – 0.01 mg/L

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- Total Selenium – 0.002 mg/L
- Total Zinc – 0.015 mg/L

These concentrations are typically less than those reported on DMRs over the past two years, and serve as a reasonable basis for BPJ TBELs for Outfall 005 in this permit term.

3. WQBELs

Outfall 005 will discharge to the condenser discharge channel at a rate of 5.5 MGD. The discharge will be near the existing Outfall 007 discharge, and the combined effect of the two outfalls should be considered in the water quality analysis. Consequently, the combined 005 and 007 discharges were modeled using PENTOXSD. Parameters of concern for modeling were determined using DEP's Toxics Screening Analysis (**Attachment B**). The modeling results indicate that WQBELs do not govern for either discharge.

4. Proposed Limits and Monitoring Requirements

DEP proposes a combination of ELGs, treatment standards and BPJ TBELs for the Outfall 005 discharge. The proposed BPJ TBELs will be established as average monthly concentration and mass limits, with corresponding maximum daily and IMAX limits assigned as appropriate. A monitoring requirement for Total Manganese has been established based on the periodic exceedances at WQN0201. TDS in the Outfall 004 discharge generally does not exceed 1,000 mg/L, such that routine monitoring for TDS and its major constituent ions is not warranted. The proposed limitations and monitoring requirements are presented in **Attachment B**.

C. IMP 501 – Chemical Metal Cleaning Wastes

According to PPL's project narrative for the new IWTP, metal cleaning waste is generated approximately once every two years on-site. Currently, PPL ships metal cleaning waste off-site for injection in a deep well and will continue to send the spent cleaner off-site for disposal; however, rinse waters may be treated on-site at the new IWTP.

According to 40 CFR 125.3, technology-based treatment requirements cannot be met through the use of flow augmentation. In other words, in the case of metal cleaning waste, the wastewater cannot be comingled with other low volume wastewater sources and compliance measured at the end of the comingled discharge. Therefore, the ELGs for metal cleaning waste in 40 CFR 423.12(b)(5) must be met at the point of the discharge prior to entering the IWTP. The following ELGs are required:

- TSS – 30 mg/L 30-day average, 100 mg/L maximum daily;
- Oil and Grease – 15 mg/L 30-day average, 20 mg/L maximum daily;
- Total Copper – 1.0 mg/L 30-day average and maximum daily; and
- Total Iron – 1.0 mg/L 30-day average and maximum daily.

In addition to these, the requirements for pH (6 – 9 S.U.) and Oil and Grease (30 mg/L IMAX) from Chapter 95 will be imposed. Flow monitoring will be established as well.

D. Outfall 007 – FGD Wastewater

The FGD treatment plant, which began operating in 2008, currently receives wastewater from the FGD scrubber units and landfill leachate (the leachate may be diverted to the future IWTP associated with Outfall 005). The FGD wastewater pumped to the treatment plant is processed using the following system configuration:

Equalization Tank (2) → Desaturation Tanks (2) → Coagulation-Precipitation Tanks (2) → Flocculation Tanks (2) → Sedimentation Tanks (2) → pH Control (2) → Filtration (2) → 007 to the Susquehanna River

According to the WQM permit application for the facility, influent to the FGD treatment plant enters two equalization tanks and from there wastewater is pumped to two desaturation tanks, which have an average detention time of 2.25 hours. While the wastewater is in the desaturation tanks, lime slurry is added to adjust the pH, desaturate the remaining gypsum (CaSO_4) and precipitate some heavy metals. Also, sludge from the clarifier/thickener tanks is recycled into the desaturation tanks. Wastewater then flows by gravity to the coagulation-precipitation units where ferric chloride and TMT-15, an organosulfide, are used to reduce some heavy metals with an average reaction time of 45 minutes. The addition of ferric chloride

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implements iron coprecipitation which aids in the removal of arsenic and other pollutants. The addition of organosulfides aids in the removal of mercury and other heavy metals. Wastewater flows from the coagulation-precipitation tanks to two clarifier/thickener tanks. Each clarifier/thickener unit has two compartments, reaction and settle. An anionic polymer is added to aid coagulation. Wasted sludge is sent to filter belt press units for dewatering, with the filtrate pumped to the equalization tank and dewatered sludge landfilled. The clarified effluent then flows to two pH adjustment tanks with an average detention time of 2.25 hours. The pH is adjusted with the addition of hydrochloric acid. Effluent exiting the blending tanks then flows by gravity to two effluent filters (64 ft²) with a designed average loading rate of 1.95 gpm/ft². The filter backwash is collected in two additional tanks and then returned to the equalization tank. The filtered effluent then flows to two final effluent tanks with an average detention time of 1.5 hours. The final effluent is then pumped to Outfall 007.

1. Effluent Limitation Guidelines (ELGs) and Treatment Standards

PPL's FGD wastewater discharge commenced in 2008. PPL's existing permit included monitoring for a suite of potential pollutants that were thought to be present in the discharge. At the time the permit was issued there were no published ELGs specific to FGD wastewaters; FGD wastewaters had historically been considered part of "low volume wastes" regulated under 40 CFR 423.12(b)(3). In 2013 EPA published draft ELGs for FGD wastewaters (40 CFR 423.13(g)(1)). EPA has noted that when final ELGs are published, the ELGs may apply only to facilities with a capacity of 2,000 MW or greater, and facilities under 2,000 MW (such as Brunner Island) may have ELGs determined on a site-specific basis using BPJ. As the proposed ELGs are only draft and subject to change before they are issued as final, they are not yet applicable and DEP has not considered them in reissuing this permit. However, much of the data and analyses that supported the development of the draft ELGs are applicable and have been considered.

In addition, 25 Pa. Code §§ 95.2(1) (pH between 6 – 9 S.U.) and 95.2(2)(ii) (Oil and Grease 15 mg/L average monthly and 30 mg/L IMAX) are applicable to this discharge.

2. Best Professional Judgment (BPJ) TBELs

The following presents DMR data for Outfall 007 in 2012 and 2013:

Table 3: 2012 and 2013 DMR Statistics for Outfall 007

Pollutant	Average Concentration	95 th Percentile Concentration	Maximum Concentration	% of Results "Non-Detect"
Total Aluminum	< 0.98 mg/L	< 2.5 mg/L	< 2.5 mg/L	76
Total Antimony	< 0.156 mg/L	< 0.5 mg/L	< 0.5 mg/L	96
Total Arsenic	< 0.13 mg/L	< 0.287 mg/L	< 0.36 mg/L	83
Total Boron	388 mg/L	477 mg/L	553 mg/L	0
Total Cadmium	< 0.017 mg/L	< 0.049 mg/L	< 0.05 mg/L	38
Chloride	14,213 mg/L	18,670 mg/L	21,500 mg/L	0
Total Chromium	< 0.048 mg/L	< 0.13 mg/L	< 0.13 mg/L	76
Total Copper	< 0.077 mg/L	< 0.229 mg/L	< 0.25 mg/L	96
Fluoride	48.5 mg/L	59.9 mg/L	69.1 mg/L	0
Total Iron	< 1.39 mg/L	< 1.5 mg/L	< 1.5 mg/L	92
Total Lead	< 0.053 mg/L	< 0.15 mg/L	< 0.15 mg/L	100
Total Mercury	0.0106 mg/L	0.0651 mg/L	0.0866 mg/L	0
Total Molybdenum	< 0.15 mg/L	< 0.5 mg/L	< 0.5 mg/L	33
Total Nickel	0.61 mg/L	1.46 mg/L	1.8 mg/L	0
Total Selenium	< 0.46 mg/L	< 1.17 mg/L	1.4 mg/L	33
Total Thallium	< 0.149 mg/L	< 0.5 mg/L	< 0.5 mg/L	46
Total Zinc	< 0.11 mg/L	< 0.25 mg/L	0.78 mg/L	25
Nitrate as N	90 mg/L	117.8 mg/L	126.3 mg/L	0

Based on the nature of the FGD wastestream and the associated treatment system, it is appropriate to establish BPJ TBELs for Outfall 007 in PPL's renewed permit. This is consistent with EPA's established guidance as it pertains specifically to FGD wastewater ("National Pollutant Discharge Elimination System (NPDES) Permitting of Wastewater Discharges from Flue Gas Desulfurization (FGD) and Coal Combustion Residuals (CCR) Impoundments at Steam Electric Power Plants", June 7, 2010):

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Where EPA has not promulgated technology-based effluent guidelines for a particular class or category of industrial discharger, or where the technology-based effluent guidelines do not address all wastestreams or pollutants discharged by the industrial discharger, EPA must establish technology-based effluent limitations on a case-by-case basis in individual NPDES permits, based on its best professional judgment or "BPJ." EPA establishes such limitations pursuant to its authority under CWA section 402(a)(1) which authorizes EPA to include in permits "such conditions as the Administrator determines are necessary to carry out the provision of [the CWA]". 33 USC § 1342(a)(1)(B). Because Section 301 of the CWA requires technology-based effluent limitations as a minimum level of control, such case-by-case technology limitations are "necessary to carry out the provision of this chapter" prior to the development of an applicable effluent guidelines and therefore must be included in any NPDES permit issued under section 402(a), as provided in EPA's implementing regulations. See 40 CFR 125.3(a) ("Technology-based treatment requirements under section 301(b) of the Act represent the minimum level of control that must be imposed in a permit issued under Section 402 of the Act"). See also 40 CFR 122.44(a)(1); 125.3(c) and (d).

In addition to the above guidance, DEP considered the following EPA documents and publications, as well as the references identified in Section III:

- Determination of Technology-Based Effluent Limits for the Flue Gas Desulfurization Wastewater at Merrimack Station in Bow, New Hampshire, EPA Region I, September 23, 2011.
- Steam Electric Power Generating Point Source Category: Final Detailed Study Report, October 2009 (EPA 821-R-09-008).

These documents generally consider the following types of treatment technologies: settling ponds, physical/chemical treatment (precipitation), physical/chemical and biological treatment, evaporation, and zero discharge.

Based on DEP's review of the available proven technology to treat FGD wastewater and considering the requirements of 40 CFR 125.3(d)(3)(i)-(v), DEP considers treatment performance consistent with physical/chemical treatment, including iron co-precipitation and sulfide-based precipitation, to be BAT for FGD wastewater. PPL already has the appropriate physical/chemical precipitation technology and, based on DMR data reported for 2012 and 2013, treatment performance is satisfactory.

DEP did consider adding fixed-film anoxic/anaerobic biological treatment to the existing treatment system as part of the BAT determination. Biological treatment would substantially improve removal of Total Selenium and NO₂/NO₃-N from the FGD wastewater, and EPA has identified seven U.S. power plants that are using or constructing physical/chemical and biological treatment (particularly anoxic/anaerobic biological systems). This indicates that some coal-fired power plants are moving towards this technology to comply with effluent limitations. There remains, however, significant uncertainty regarding the effluent limits that may be achieved reliably at any given coal-fired station. EPA Region I did determine that biological treatment was BAT as part of their analysis of Merrimack Station in Bow, New Hampshire, but substantially more Total Selenium was present in the raw FGD wastewater at Merrimack than is present at PPL Brunner Island.

EPA is in the process of developing a revised ELG applicable to Steam Electric Power Stations, including FGD wastewater. EPA has proposed more stringent effluent limits for Total Selenium in the draft ELG, but those limits and the statistical analyses that they are based on have not been approved as final. The final ELG is projected to be available in 2015, and DEP considers it appropriate to wait for the release of the final ELG before assigning more stringent BAT effluent limits for Total Selenium and NO₂/NO₃-N.

Consideration of each requirement of 40 CFR 125.3(d)(3) is discussed below.

- Age of Equipment and Facilities Involved – The current FGD treatment facility at PPL is of modern design and is relatively new (approximately 6 years old). This was considered in the BAT decision-making process.
- Process Employed and Process Changes – The performance of the existing physical/chemical treatment system has been established and forms the baseline for overall treatment system performance. The boilers used at the station are designed for only one type of coal. Therefore, PPL may be able to blend various types of coal, but could not significantly alter their coal type used. Consequently, DEP generally expects that any changes in coal characteristics will not substantively alter the performance of the chemical/physical treatment system.

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- Engineering Aspects of the Application of Various Types of Control Techniques – There are no new or revised engineering considerations involved in selecting treatment performance consistent with the existing treatment systems as BAT.
- Cost of Achieving Effluent Reduction – There are no new costs involved in selecting treatment performance consistent with the existing treatment systems as BAT.
- Non-Water Quality Environmental Impacts – There are no non-water quality environmental impacts involved in selecting treatment performance consistent with the existing treatment systems as BAT.

Derivation of TBELs

The proposed TBELs are listed in Table 4. DEP is proposing to establish TBELs based on existing performance where effective physical/chemical precipitation treatment has been demonstrated. In general, DEP has used the maximum detected concentration in Outfall 007 as reported on DMRs during 2013 as average monthly limits (AMLs), except as noted below in Table 4. This use of the maximum detected concentration reflects the fact that the permittee's monitoring data for over the previous five years generally did not achieve quantitation limits that were sensitive enough to be meaningful and amenable to long-term statistical analysis. PPL improved its quantitation limits in 2013, and DEP has proposed a Part C condition with appropriate quantitation limits to address this issue in the subsequent permit term.

All pollutants with average monthly limits (AMLs) will have maximum daily and IMAX limits established using multipliers of 2.0 and 2.5 of the average monthly limits, respectively, consistent with standard DEP procedures.

Table 4: TBELs for Outfall 007

Pollutant	TBEL (AML), mg/L
Total Aluminum ¹	0.4
Total Antimony ²	Monitor
Total Arsenic ³	0.02
Total Boron ²	Monitor
Total Cadmium	0.017
Chloride ⁴	Monitor
Total Chromium	0.084
Total Copper	0.015
Fluoride	Monitor
Total Iron ⁴	Monitor
Total Lead ⁵	Monitor
Total Manganese ⁶	Monitor
Total Mercury	0.00189
Total Molybdenum	0.06
Total Nickel	0.78
Total Selenium	1.2
Total Thallium	0.005
Total Zinc	0.041
Nitrite/Nitrate as N	Monitor
Total Dissolved Solids ⁷	Monitor
Bromide ⁷	Monitor
Sulfate ⁷	Monitor

NOTES:

1. Maximum result in 2013 is a "non-detect" result; the laboratory quantitation limit will be established as the TBEL.
2. This parameter cannot be removed effectively using existing PPL existing treatment technology or the proposed BAT technology, and will therefore be subject to ongoing monitoring only.
3. All results in 2013 have been "< 0.02 mg/L" or less except for one detection of 0.29 mg/L, which is considered an outlier.

Discussion

4. This parameter is introduced into the wastestream to enhance treatment performance; it is appropriate to continue monitoring for this parameter.
5. There were no detections of this parameter in 2013; continued monitoring is deemed appropriate.
6. This parameter has not been monitored to date through DMRs, but will be established in the permit for monitoring only due to periodic exceedances of WQ criteria at WQN0201.
7. This parameter has not been monitored to date through DMRs, but will be established in the permit for monitoring only due to elevated concentrations of TDS (>1,000 mg/L) and its constituent ions reported in the permit application. For the purpose of compliance with 25 Pa. Code § 95.10 as it relates to TDS loading, this facility is classified as "Authorized Load/No Increase." The monitoring data collected during this permit term will be used to develop an existing mass loading as described in DEP's guidance (385-2100-002).

3. WQBELs

Attachment B presents a toxics screening analysis for the combined Outfall 005 and Outfall 007 discharges. Parameters that were candidates for PENTOXSD modeling were analyzed using the input data described in **Attachment B**. The results demonstrate that there is no reasonable potential for exceedances of water quality criteria, and therefore WQBELs will not be established for either discharge.

The Net Total Nitrogen and Net Total Phosphorus mass limits ("cap loads") of zero for compliance with DEP's Chesapeake Bay Watershed Implementation Plan will remain in the renewed permit.

4. Proposed Limits and Monitoring Requirements

DEP proposes a combination of ELGs, treatment standards, BPJ TBELs and WQBELs as concentration and mass limits for the Outfall 007 discharge. The proposed limitations and monitoring requirements are presented in **Attachment B**.

II. Other Modifications to the March 9, 2012 Draft Permit

1. The latest standard conditions (Parts A and B) in use by DEP will be used for the revised draft permit.
2. Quantitation Limits – The permit application included "non-detect" results with quantitation limits (QLs) that significantly exceed QLs that are reasonably attainable for wastewater analysis (e.g., Total Thallium at 0.5 mg/L). Where elevated QLs are used, it is uncertain whether actual pollutant concentrations are present that could pose water quality concerns. DEP proposes to include a Part C condition that would specify maximum QLs for parameters in the permit. Where there is an effluent limit, the QL may not exceed the limit. Where there is no limit, maximum QLs will be specified. If matrix interference is suspected, the laboratory may need to dilute wastewater samples and adjust concentration results accordingly.
3. Toxics Reduction Evaluation (TRE) – The proposed TRE for Outfall 007 is not necessary for this permit because PENTOXSD modeling has determined that WQBELs do not govern. The TRE condition that was previously proposed as Part C IV in the original draft permit will be removed.
4. Chemical Additives - The latest Chemical Additives permit language will be used, which refers the permittee to DEP's "Approved List" of chemical additives and requires the completion of "Chemical Additives Notification Forms" to DEP prior to usage of additives on the approved list. The original draft permit's Chemical Additives condition in Part C VI will be replaced with the new language based on DEP's Chemical Additives SOP.
5. Whole Effluent Toxicity (WET) – The original draft permit called for acute WET testing of Outfall 007 effluent. However, because there are no governing WQBELs for this discharge, and because there will be chemical-specific limits, WET testing will be removed from the revised draft permit.
6. Footnote No. 13 of the existing permit was removed from the March 9, 2012 draft permit. This footnote specifies that sampling for trihalomethanes (THMs) is required only when biocides containing chlorine or bromine are introduced. The footnote will be re-established in the revised draft permit. However, the sentence concerning the need to conduct separate analysis for each component of THMs is unnecessary and will be removed.

Discussion

7. Stormwater Outfalls – PPL's existing NPDES permit has 19 stormwater outfalls, and six are monitored annually as they have been deemed representative of the site. The following modifications to the March 9, 2012 draft permit are recommended concerning stormwater outfalls:
 - Outfall 006 has traditionally been characterized as a groundwater discharge, but it has been concluded that the discharge is actually stormwater. This outfall has been monitored annually in previous permits, and this monitoring will continue in the renewed permit. The permit will re-characterize this discharge as stormwater.
 - Outfall 008 in the existing permit was renumbered to Outfall 027 in the March 9, 2012 draft permit. Outfall 008 will remain as 008 in the revised draft permit.
 - New stormwater Outfalls 027, 028 and 029 (numbered as 028, 029 and 030 in the March 9, 2012 draft permit) will be established in the revised draft permit. Outfall 027 will discharge to the condenser discharge channel in the same pipe as Outfall 007.
 - Outfall 030 will be introduced in the revised draft permit; this outfall will be located at the existing Outfall 004, and will discharge stormwater only following closure of Ash Basin No. 6.
8. Monitoring for pH at Outfall 001 will be modified to daily when condenser or cooling tower additives are introduced, instead of weekly under all circumstances; this may result in a net decrease in pH monitoring at Outfall 001, which is appropriate since Outfall 001 usually consists of (heated) river water.

III. References

1. GE Power & Water. Full Scale Operation of GE ABMet Biological Technology for the Removal of Selenium from FGD Wastewaters.
2. GE Power & Water. ABMet: Frequently Asked Questions." GE Power & Water - Water & Process Technologies. November 2009.
3. U.S. Environmental Protection Agency. Determination of Effluent Limits for Flue Gas Desulfurization (FGD) Wastewater at PSNH Merrimack Station Based on the Performance of Physical-Chemical Treatment Followed by Biological Treatment. Statistical Analysis. Washington, D.C.: Office of Water Engineering and Analysis Division (4303T), 2011.
4. CH2M Hill. Prepared for North American Metals Council. Review of Available Technologies for the Removal of Selenium from Water. Technology Review, 2010. (The Total Installed Cost (TIC) includes the cost of equipment/control building. The Operation and Maintenance Cost (OMC) includes labor, energy, maintenance, cleaning, chemical, and residual disposal cost. The cost were developed using 2009 to 2010 market conditions and the systems were targeted to achieve a selenium concentration of <5 µg/L).
5. EPRI (prepared by Water Systems Specialists, Inc.). Treatment Technology for Summary for Critical Pollutants of Concern in Power Plant Wastewaters. January 2007.
6. Eastern Research Group, Inc., Sampling Episode Report Duke Energy Carolinas' Belews Creek Steam Station Belews Creek, NC -- Sampling Episode 6558; 13 April 2012 (EPA Contract No. 68-C-02-095, Work Assignment 9-29).
7. PADEP. Policy and Procedure for NPDES Permitting of Discharges of Total Dissolved Solids – 25 Pa. Code § 95.10; November 12, 2011. DEP ID: 385-2100-002.

ATTACHMENT A
Outfall 002 Toxics Screening Analysis and Proposed Effluent Limitations

Outfall 002 Toxics Screening Analysis

Facility: **PPL Brunner Island**
Analysis Hardness (mg/L): **120**

NPDES Permit No.: **PA0008281**
Discharge Flow (MGD): **2**

Outfall: **002**
Analysis pH (SU): **8**

Parameter		Maximum Concentration in Application or DMRs (µg/L)	Most Stringent Criterion (µg/L)	Candidate for PENTOXSD Modeling?	Most Stringent WQBEL (µg/L)	Screening Recommendation
Total Dissolved Solids		229000	500000	No		
Bromide	<	6000	N/A	No		
Sulfate		77300	250000	No		
Total Aluminum		648	750	No		
Total Arsenic		3	10	No		
Total Boron		117	1600	No		
Total Cadmium	<	1	0.279	Yes		
Total Chromium	<	2	N/A	No		
Total Copper	<	20	10.47	Yes		
Total Iron		970	1500	No		
Total Lead	<	5	3.07	Yes		
Total Mercury		0.0094	0.05	No		
Total Molybdenum	<	20	N/A	No		
Total Nickel	<	20	60.7	No		
Total Selenium	<	4	4.6	No		
Total Zinc	<	36	136.8	No		
Total Barium		43	2400	No		
Total Manganese		33	1000	No		

Note – All maximum concentrations are those reported on DMRs from 2012 – 2013 except parameters not routinely monitored. Total Dissolved Solids, Bromide, Sulfate, Total Barium and Total Manganese concentrations are from PPL's permit application.

Total Cadmium and Total Lead have been identified as candidates for PENTOXSD modeling because the QLs used exceeded water quality standards. However, these parameters are not of water quality concern due to the significant stream to waste flow ratio (> 1,000:1).

Outfall 002 Proposed Effluent Limitations

Parameter	Effluent Limitations					Monitoring Requirements	
	Mass Units (lbs/day)		Concentrations (mg/L)			Minimum Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Min	XXX	9.0	1/day	Grab
Oil and Grease	XXX	XXX	15	20	30	2/month	Grab
Total Suspended Solids	XXX	XXX	30	50	50	2/month	Grab
Total Aluminum	XXX	XXX	XXX	Report	XXX	1/quarter	Grab
Total Arsenic	XXX	XXX	XXX	Report	XXX	1/quarter	Grab
Total Boron	XXX	XXX	XXX	Report	XXX	1/quarter	Grab
Total Cadmium	XXX	XXX	XXX	Report	XXX	1/quarter	Grab
Total Chromium	XXX	XXX	XXX	Report	XXX	1/quarter	Grab
Total Copper	XXX	XXX	XXX	Report	XXX	1/quarter	Grab
Total Iron	XXX	XXX	XXX	Report	XXX	1/quarter	Grab
Total Lead	XXX	XXX	XXX	Report	XXX	1/quarter	Grab
Total Manganese	XXX	XXX	XXX	Report	XXX	1/quarter	Grab
Total Mercury	XXX	XXX	XXX	Report	XXX	1/quarter	Grab
Total Molybdenum	XXX	XXX	XXX	Report	XXX	1/quarter	Grab
Total Nickel	XXX	XXX	XXX	Report	XXX	1/quarter	Grab
Total Selenium	XXX	XXX	XXX	Report	XXX	1/quarter	Grab
Total Zinc	XXX	XXX	XXX	Report	XXX	1/quarter	Grab

ATTACHMENT B
Outfalls 005 and 007 Toxics Screening Analysis, Model Results and Proposed Effluent Limitations

Combined Outfalls 005 & 007 Toxics Screening Analysis

Facility: PPL Brunner Island
Analysis Hardness (mg/L): 2,790

NPDES Permit No.: PA0008281
Discharge Flow (MGD): 6.02

Outfalls: 005/007
Analysis pH (SU): 8

Parameter	Maximum Concentration in Application or DMRs (µg/L) ¹	Most Stringent Criterion (µg/L)	Candidate for PENTOXSD Modeling?	Most Stringent WQBEL (µg/L)	WQBEL Screening Recommendation
Total Dissolved Solids	3,661,960	500000	Yes	N/A (PWS) ²	Monitor
Chloride	1,735,050	250000	Yes	N/A (PWS) ²	Monitor
Bromide	< 26,721	N/A	No		Monitor
Sulfate	266,437	250000	Yes	N/A (PWS) ²	Monitor
Total Aluminum	< 416	750	No		
Total Antimony	< 17.8	5.6	Yes	1921	No Limits/Monitoring
Total Arsenic	32.4	10	Yes	3430	No Limits/Monitoring
Total Boron	40,735	1600	Yes	536548	No Limits/Monitoring
Total Cadmium	< 1.9	2.453	No		
Total Copper	< 5.8	153.95	No		
Fluoride	< 6,151	2000	Yes	N/A (PWS) ²	
Total Iron	751	1500	No		
Total Lead	< 2.6	67.39	No		
Total Mercury	< 0.169	0.05	Yes	17.15	No Limits/Monitoring
Total Molybdenum	< 8.8	N/A	No		
Total Nickel	< 97	610	No		
Total Selenium	< 107	4.6	Yes	1598	No Limits/Monitoring
Total Thallium	< 9.6	0.24	Yes	82.3	Monitor
Total Zinc	< 16.3	1966.6	No		
Total Manganese	< 2,473	1000	Yes	292040	No Limits/Monitoring
Free Available Cyanide	< 53	5.2	Yes	1461	No Limits/Monitoring
Total Phenols (Phenolics)	< 5.7	5	Yes	N/A (PWS) ²	
Bis(2-Ethylhexyl)Phthalate	< 9.2	1.2	Yes	39.366	No Limits/Monitoring

- Maximum concentrations reported on 2013 DMRs or PPL's permit application for Outfalls 005 and 007 were mass balanced to produce a maximum concentration for the combined discharge. See chart on following page. Only those toxic parameters that are monitored in the existing permit and/or were detected in effluent as reported on PPL's permit application are shown.
- A WQBEL is not applicable (a public water supply (PWS) withdrawal was not within the modeled reach).

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Derivation of Maximum Combined 005/007 Effluent Concentrations for Toxics Screening Analysis¹

Parameter	Max Concentration Outfall 005 (mg/l)	Max Concentration Outfall 007 (mg/l)	Combined Max Concentration (mg/l)
Total Dissolved Solids	198	40,300	3,661.96
Chloride	150	18,500	1,735
Bromide	0.6	303	26.72
Sulfate	58.1	2470	266.4
Total Aluminum	0.417	0.4	0.4155
Total Antimony	0.01	0.1	0.01777
Total Arsenic	0.008	0.29	0.032
Total Boron	0.15	470	40.735
Total Cadmium	0.0005	0.017	0.0019
Total Copper	0.004	0.025	0.0058
Fluoride	0.2	69.1	6.15
Total Iron	0.68	1.5	0.7508
Total Lead	0.001	0.02	0.0026
Total Mercury	0.000006	0.00189	0.0001687
Total Molybdenum	0.004	0.06	0.0088
Total Nickel	0.032	0.78	0.0966
Total Selenium	0.004	1.2	0.107
Total Thallium	0.01	0.005	0.00956
Total Zinc	0.014	0.041	0.016
Total Manganese	0.032	28.3	2.47
Free Available Cyanide	0.005	0.56	0.0529
Total Phenols (Phenolics)	0.005	0.013	0.00569
Bis(2-Ethylhexyl)Phthalate	0.005	0.054	0.0092

¹ Equation used: (5.5 MGD Outfall 005 Flow x Max Outfall 005 Concentration) + (0.52 MGD Outfall 007 Flow x Max Outfall 007 Concentration) / 6.02 MGD Combined Flow.

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Combined 005 and 007 PENTOXSD Modeling

Outfall 005 will discharge an average of 5.5 MGD of industrial wastewater to the condenser discharge channel. Outfall 007 currently discharges to the condenser discharge channel at a design flow rate of 0.52 MGD. The design flow of the discharge channel is 795 MGD (Outfall 001 once-through non-contact cooling water); this flow is withdrawn from the Susquehanna River, through the plant, and back into the River, with no expected measurable increase in concentrations of toxic parameters. Based on extensive field studies, the near-field mixing characteristics of the PPL Brunner Island condenser discharge channel are well understood. During the previous permit renewal application review process, DEP had developed empirical mixing relationships between flow in the discharge channel and the Susquehanna River. These mixing relationships were based on field observations and measurements from 2002 through 2006. The chronic (12-hour) partial mix factor (PMF) was estimated to be 100% and the acute (15-minute) PMF was estimated to be 30%. These PMFs have been used to evaluate WQBELs in this revised draft permit, such that WQBEL results vary from the work presented in the previous draft permit which used default mixing relationships. Based on the proximity of the two outfalls and the mixing characteristics observed during field observations, it is appropriate to evaluate potential WQBELs by combining the Outfall 005 and 007 discharges in the channel and modeling this flow as a single discharge to the Susquehanna River.

PENTOXSD Model Inputs

1. Modeled Reach – Susquehanna River, RMI 54.27 (confluence of discharge channel and River) to RMI 50.94 (confluence of Codorus Creek and River).
2. Discharge Flow – 6.02 MGD (Outfall 005: 5.5 MGD + Outfall 007: 0.52 MGD).
3. Q7-10 River Flow – 3,185 cfs (as established in the PPL 2006 permit fact sheet).
4. Discharge Hardness – 2,790 mg/L, determined as follows:

$$(5.5\text{MGD})(136\text{ mg/L}) + (0.52\text{ MGD})(30,867\text{ mg/L}) / 6.02\text{ MGD} = 2,790\text{ mg/L}$$

5. Background Hardness – 120 mg/L (median hardness 2012-2013 at WQN0202, Harrisburg).
6. Discharge pH – 8.0 S.U. (median pH of Outfalls 004 (to be 005) and 007).
7. Background pH – 7.9 S.U. (median pH 2012-2013 at WQN0202).
8. Background Parameter Concentrations – see table below:

Parameter	Background Concentration ¹ (mg/L)
Total Dissolved Solids	188 ²
Chloride	14.4 ³
Sulfate	37.9 ²
Total Aluminum	0.543 ³
Total Antimony	< 0.01 (0) ²
Total Arsenic	< 0.05 (0) ²
Total Boron	0.02 ²
Total Cadmium	< 0.001 (0) ²
Fluoride	< 0.2 (0.2) ²
Total Mercury	< 0.0002 (0) ²
Total Selenium	0.00033 ³
Total Thallium	< 0.01 (0) ²
Total Zinc	< 0.016 (0.016) ³
Total Manganese	0.149 ³
Free Available Cyanide	< 0.005 (0) ²
Total Phenols (Phenolics)	< 0.005 (0) ²
Bis(2-Ethylhexyl)Phthalate	< 0.005 (0) ²

NOTES:

- 1 For background conditions, non-detect data are assumed to equal zero ("0") where the parameter is not considered to be a "naturally occurring pollutant." Where the parameter is listed in Table 1 of DEP's "Implementation Guidance for the Determination and Use of Background/Ambient Water Quality in the

PPL Brunner Island

Determination of Wasteload Allocations and NPDES Effluent Limitations for Toxic Substances” (DEP ID 391-2000-022), the quantitation limit is used as the background concentration.

- 2 *Where data for parameters were not available at WQN0202 (Harrisburg), average River intake values were used as reported in PPL’s application.*
- 3 *Median data from WQN0202, October 2012 – December 2013.*

9. Discharge Concentrations – see “Maximum Concentration in Application or DMRs” column of the Toxics Screening Analysis for Outfalls 005 and 007, Attachment B.
10. PMFs – 0.3 (Acute Aquatic Life Criteria), 1.0 (Chronic Aquatic Life Criteria) and 1.0 (Threshold Human Health Criteria) (based on infrared imaging studies completed for the previous permit).
11. River Slope – 0.0006 ft/ft (examination of the York Haven USGS Quad map determined an elevation of 252.5 at the discharge channel/River confluence and an elevation of 241 at the Codorus Creek/River confluence, for a slope of approximately 0.0006).
12. River Width – 4,500 feet (approximate).
13. River Velocity – 0.72 feet per second (fps) (based on DEP thermal studies completed in 2002 under low flow conditions, in which the condenser discharge channel flow traveled 650 feet in 15 minutes after confluence with the River).

NOTE: River slope, width, velocity do not affect PENTOXSD results where PMF values are entered directly into PENTOXSD, but these parameters are listed here for completeness.

PENTOXSD Results

PENTOXSD determined WQBELs as identified in the “Most Stringent WQBEL” column of the Toxics Screening Analysis for Outfalls 005 and 007, Attachment B, and as shown below. The “input concentration” was the governing criterion in all cases, indicating that the discharge concentration exceeded the most stringent WQBEL for each parameter. In conclusion, WQBELs are not governing for the Outfalls 005 and 007 discharges, and no WQBELs will be established in PPL’s renewed permit.

PENTOXSD Analysis Results**Recommended Effluent Limitations**

SWP Basin	Stream Code:	Stream Name:			
07K	6685	SUSQUEHANNA RIVER			
RMI	Name	Permit Number	Disc Flow (mgd)		
54.27	PPL BI	PA0008281	6.0200		
Parameter	Effluent Limit (µg/L)	Governing Criterion	Max. Daily Limit (µg/L)	Most Stringent	
				WQBEL (µg/L)	WQBEL Criterion
ANTIMONY	17.8	INPUT	27.771	1920.785	THH
ARSENIC	32.4	INPUT	50.549	3429.973	THH
BIS(2-ETHYLHEXYL) PHTHALATE	9.2	INPUT	14.353	39.366	CRL
BORON	40735	INPUT	63553.15	536548.2	AFC
CHLORIDE (PWS)	1730000	INPUT	2700000	NA	NA
CYANIDE, FREE	53	INPUT	82.689	1460.864	AFC
FLUORIDE (PWS)	6151	INPUT	9596.549	NA	NA
MANGANESE	2473	INPUT	3858.278	292039.7	THH
MERCURY	0.169	INPUT	0.284	17.15	THH
PHENOLICS (PWS)	5.7	INPUT	8.893	NA	NA
SELENIUM	107	INPUT	166.937	1598.407	CFC
SULFATE (PWS)	266437	INPUT	415684.6	NA	NA
THALLIUM	9.6	INPUT	14.978	82.319	THH
TOTAL DISSOLVED SOLIDS (PWS)	3660000	INPUT	5710000	NA	NA

Outfall 005 Proposed Effluent Limitations

Parameter	Effluent Limitations					Monitoring Requirements	
	Mass Units (lbs/day)		Concentrations (mg/L)			Minimum Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Min	XXX	9.0	1/day	Grab
Oil and Grease	688	917	15	20	30	2/month	Grab
Total Suspended Solids	1,376	2,294	30	50	50	2/month	24-hour comp
Total Aluminum	13.3	26.6	0.29	0.58	0.73	1/month	24-hour comp
Total Arsenic	0.275	0.55	0.006	0.012	0.015	1/month	24-hour comp
Total Boron	9.2	18.4	0.2	0.4	0.5	1/month	24-hour comp
Total Cadmium	0.0092	0.0184	0.0002	0.0004	0.0005	1/month	24-hour comp
Total Chromium	0.092	0.184	0.002	0.004	0.005	1/month	24-hour comp
Total Copper	0.183	0.367	0.004	0.008	0.010	1/month	24-hour comp
Total Iron	12.4	24.8	0.27	0.54	0.68	1/month	24-hour comp
Total Lead	0.046	0.092	0.001	0.002	0.0025	1/month	24-hour comp
Total Manganese	XXX	XXX	XXX	Report	XXX	1/month	24-hour comp
Total Mercury	0.00021	0.00042	0.0000046	0.0000092	0.0000115	1/month	24-hour comp
Total Molybdenum	0.46	0.92	0.01	0.02	0.025	1/month	24-hour comp
Total Nickel	0.46	0.92	0.01	0.02	0.025	1/month	24-hour comp
Total Selenium	0.092	0.184	0.002	0.004	0.005	1/month	24-hour comp
Total Zinc	0.69	1.38	0.015	0.030	0.038	1/month	24-hour comp

Outfall 007 Proposed Effluent Limitations

Parameter	Effluent Limitations					Monitoring Requirements	
	Mass Units (lbs/day)		Concentrations (mg/L)			Minimum Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Min	XXX	9.0	1/day	Grab
Oil and Grease	65	86.7	15	20	30	2/month	Grab
Total Suspended Solids	130	434	30	100	100	2/month	24-hour comp
Total Aluminum	1.73	3.46	0.4	0.8	1.0	1/week	24-hour comp
Total Arsenic	0.087	0.173	0.02	0.04	0.05	1/week	24-hour comp
Total Cadmium	0.074	0.148	0.017	0.034	0.043	1/week	24-hour comp
Total Chromium	0.364	0.728	0.084	0.168	0.21	1/week	24-hour comp
Total Copper	0.065	0.13	0.015	0.03	0.038	1/week	24-hour comp
Total Mercury	0.0082	0.0164	0.00189	0.00378	0.00473	1/week	24-hour comp
Total Molybdenum	0.26	0.52	0.06	0.12	0.15	1/week	24-hour comp
Total Nickel	3.4	6.8	0.78	1.56	1.95	1/week	24-hour comp
Total Selenium	5.2	10.4	1.2	2.4	3.0	1/week	24-hour comp
Total Thallium	0.022	0.044	0.005	0.01	0.013	1/week	24-hour comp
Total Zinc	0.178	0.356	0.041	0.082	0.103	1/week	24-hour comp
Fluoride	XXX	XXX	XXX	Report	XXX	1/month	24-hour comp
Total Dissolved Solids	XXX	XXX	XXX	Report	XXX	1/month	24-hour comp
Bromide	XXX	XXX	XXX	Report	XXX	1/month	24-hour comp

Parameter	Effluent Limitations					Monitoring Requirements	
	Mass Units (lbs/day)		Concentrations (mg/L)			Minimum Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant. Maximum		
Chloride	XXX	XXX	XXX	Report	XXX	1/month	24-hour comp
Sulfate	XXX	XXX	XXX	Report	XXX	1/month	24-hour comp
Total Antimony	XXX	XXX	Report	Report	XXX	1/month	24-hour comp
Total Boron	XXX	XXX	Report	Report	XXX	1/month	24-hour comp
Total Iron	XXX	XXX	Report	Report	XXX	1/month	24-hour comp
Total Lead	XXX	XXX	Report	Report	XXX	1/month	24-hour comp
Total Manganese	XXX	XXX	Report	Report	XXX	1/month	24-hour comp
Ammonia-N	Report Mo Total	Report Annual Total	Report	XXX	XXX	2/month	24-Hr Composite
Total Kjeldahl Nitrogen (TKN)	Report Mo Total	XXX	Report	XXX	XXX	2/month	24-Hr Composite
Nitrate-Nitrite as N	Report Mo Total	XXX	Report	XXX	XXX	2/month	24-Hr Composite
Total Nitrogen	Report Mo Total	Report Annual Total	Report	XXX	XXX	2/month	24-Hr Composite
Total Nitrogen Intake	Report Mo Total	XXX	Report	XXX	XXX	2/month	24-Hr Composite
Total Phosphorus	Report Mo Total	Report Annual Total	Report	XXX	XXX	2/month	24-Hr Composite
Total Phosphorus Intake	Report Mo Total	XXX	Report	XXX	XXX	2/month	24-Hr Composite
Net Total Nitrogen	Report Mo Total	0 Annual Total	XXX	XXX	XXX	1/month	Calculation
Net Total Phosphorus	Report Mo Total	0 Annual Total	XXX	XXX	XXX	1/month	Calculation